

### **ABSTRACT OF THE DISCLOSURE**

A system and method for detecting and diagnosing disease states in a body part is described. The method is based on a set of electrical impedance measurements taken on the surface of a body part and a representation of the body part in the form of a network of impedances that would result in the same surface measurements as the actual body part. The system includes an electrical data unit for measuring electrical data of the body part, the electrical data unit having a plurality of  $N_e$  electrodes. The system also includes a network module for representing the body part by a network, the network having external nodes and internal nodes connected by current pathways. The system further includes an electrical properties module for determining electrical properties of the pathways using the measured electrical data, and a diagnosis module for utilizing the electrical properties to diagnose the possibility of disease in the body part. It is well known, for example, that tissue electrical impedance changes with malignancy.